Michael Crawshaw

Ph.D. Student
George Mason University
Research Interests: Optimization for machine learning, Distributed optimization

mcrawsha@gmu.edu
Personal Website
Google Scholar

Education

George Mason University
Ph.D. in Computer Science — *2019 - Present*
M.S. in Computer Science — *2019 - 2022*
Advisor: Mingrui Liu

The Ohio State University — *2015 - 2019*
B.S. in Mathematics and Computer Science, Honors

Publications

Constant Stepsize Local GD for Logistic Regression: Acceleration by Instability
Michael Crawshaw, Blake Woodworth, Mingrui Liu
International Conference on Machine Learning, 2025.

Local Steps Speed up Local GD for Heterogeneous Distributed Logistic Regression
Michael Crawshaw, Blake Woodworth, Mingrui Liu
International Conference on Learning Representations, 2025.

Complexity Lower Bounds of Adaptive Gradient Algorithms for Non-convex Stochastic Optimization under Relaxed Smoothness
Michael Crawshaw, Mingrui Liu
International Conference on Learning Representations, 2025.

Federated Learning under Periodic Client Participation and Heterogeneous Data: A New Communication-Efficient Algorithm and Analysis
Michael Crawshaw, Mingrui Liu
Conference on Neural Information Processing Systems, 2024.

Provable Benefits of Local Steps in Heterogeneous Federated Learning for Neural Networks: A Feature Learning Perspective
Yajie Bao, **Michael Crawshaw**, Mingrui Liu
International Conference on Machine Learning, 2024.

Federated Learning with Client Subsampling, Data Heterogeneity, and Unbounded Smoothness: A New Algorithm and Lower Bounds
Michael Crawshaw*, Yajie Bao*, Mingrui Liu (* denotes equal contribution)
Conference on Neural Information Processing Systems, 2023.

EPISODE: Episodic Gradient Clipping with Periodic Resampled Corrections for Federated Learning with Heterogeneous Data
Michael Crawshaw, Yajie Bao, Mingrui Liu
International Conference on Learning Representations, 2023.

Robustness to Unbounded Smoothness of Generalized SignSGD
(Alphabetical order) **Michael Crawshaw**, Mingrui Liu, Francesco Orabona, Wei Zhang, Zhenxun Zhuang
Neural Information Processing Systems, 2022.

Fast Composite Optimization and Statistical Recovery in Federated Learning
Yajie Bao, **Michael Crawshaw**, Mingrui Liu
International Conference on Machine Learning, 2022.

Employment

Flatiron Institute — *May 2025 - Present*
Summer Predoctoral Researcher, Center for Computational Mathematics
- Research into optimization methods for deep neural networks, especially language models.

Olive — *March 2018 - August 2019*
Machine Learning Engineering Intern
- Developed computer vision functionality for desktop automation software with applications to healthcare operations.
- Trained deep neural networks for object detection with various techniques, including Faster R-CNN and DARTS.

Awards

Top Reviewer, ICML *2025*
Best Reviewer, AISTATS *2025*
Top Reviewer, NeurIPS (top 8%) *2023*
Institute for Digital Innovation Predoctoral Fellowship, George Mason University *2022*
NSF XSEDE startup allocation, National Science Foundation *2020*
Summer Ph.D. Research Initiation Award, George Mason University *2020*
Outstanding Graduate Teaching Assistant, George Mason University *2020*
Gordon Memorial Fund Scholarship, The Ohio State University *2017 - 2019*
Honorable Mention, Raser-Bareis-Gordon Math Competition, The Ohio State University *2017*
7th Place, FIRST Tech Challenge World Competition, FIRST *2015*

Academic Service

Reviewer, ICLR, AISTATS (awarded Best Reviewer), ICML (awarded Top Reviewer) *2025*
Reviewer, AISTATS, ICML, NeurIPS *2024*
Reviewer, NeurIPS (awarded Top Reviewer, top 8%) *2023*

Teaching

Graduate Teaching Assistant, George Mason University *2019-2022*
CS 657: Mining Massive Datasets *Fall 2020, Fall 2021*
CS 471: Operating Systems *Fall 2020, Fall 2021, Spring 2022*
CS 583: Analysis of Algorithms *Spring 2021*
CS 571: Operating Systems *Spring 2021*
CS 330: Formal Methods and Models *Fall 2019, Spring 2020*

Undergraduate Teaching Assistant, The Ohio State University *2017 - 2018*
CSE 3321: Automata and Formal Lanuages *Summer 2017, Fall 2017, Spring 2018*

Undergraduate Honors Math Mentor, The Ohio State University *2016 - 2017*
Math 4181H: Honors Analysis I *Fall 2016*
Math 4182H: Honors Analysis II *Spring 2017*

Relevant Coursework and Skills

GMU Coursework: Optimization for machine learning, deep learning, computer vision, theory of computation, algorithms, graphics, software testing.

OSU Math Coursework: Real analysis, linear algebra, differential equations, probability, statistics, combinatorics, complex analysis, number theory, abstract algebra.

OSU CS Coursework: Software, digital logic, databases, operating systems, networking, theory of computation, machine learning, neural networks, natural language processing, GPU programming (CUDA).

Programming: Python (PyTorch, TensorFlow), Bash, Java, C, Git, Latex